



| charge in cfs |           |             | Manganese Concentration Coefficients |      |                 |
|---------------|-----------|-------------|--------------------------------------|------|-----------------|
|               | Intercept | coefficient |                                      | B    | Intercept       |
|               |           |             | Low Flow November-March              |      |                 |
| M34           | -2.771    | 0.394       | -2.28954                             | A72  | 0.004 110.08249 |
| CC48          | 1.752     | 0.130       | 6.77165                              | M34  | 0.039 120.28045 |
| A68           | -11.131   | 0.498       | -3.62869                             | CC48 | 0.024 636.59640 |
|               |           |             | 0.38718                              | A68  | 0.025 37.87432  |
|               |           |             | 0.10539                              |      |                 |
|               |           |             | 0.45153                              |      |                 |

Discharge Relationships among the three gages

| MONTH        | J  | F  | M  | A   | M   | J    | J   |
|--------------|----|----|----|-----|-----|------|-----|
| Intercept    | 1  | 1  | 1  | 1   | 1   | 1    | 1   |
| A 72         | 64 | 63 | 77 | 155 | 682 | 1196 | 624 |
| M34          | 22 | 22 | 28 | 58  | 266 | 468  | 243 |
| CC48         | 14 | 13 | 15 | 22  | 91  | 158  | 83  |
| A68          | 25 | 25 | 31 | 66  | 329 | 585  | 300 |
| Ground water | 3  | 3  | 3  | 9   | -3  | -14  | -2  |

1/(1+BQ) Discharge Representation

|      |        |        |        |        |        |        |        |
|------|--------|--------|--------|--------|--------|--------|--------|
| A 72 | 0.7962 | 0.7987 | 0.7645 | 0.6173 | 0.2682 | 0.1729 | 0.2860 |
| M34  | 0.5327 | 0.5371 | 0.4823 | 0.3056 | 0.0880 | 0.0519 | 0.0955 |
| CC48 | 0.7551 | 0.7565 | 0.7368 | 0.6548 | 0.3148 | 0.2090 | 0.3339 |
| A68  | 0.6128 | 0.6171 | 0.5623 | 0.3771 | 0.1085 | 0.0640 | 0.1178 |

Date variables

|         |        |        |         |         |         |         |         |
|---------|--------|--------|---------|---------|---------|---------|---------|
| sin     | 0.1552 | 0.6358 | 0.9276  | 0.9887  | 0.7862  | 0.3629  | -0.1441 |
| cos     | 0.9879 | 0.7719 | 0.3737  | -0.1496 | -0.6180 | -0.9318 | -0.9896 |
| sin1    | 0.3066 | 0.9815 | 0.6932  | -0.2959 | -0.9717 | -0.6763 | 0.2852  |
| cos1    | 0.9518 | 0.1916 | -0.7207 | -0.9552 | -0.2361 | 0.7366  | 0.9585  |
| Consent | 1      | 1      | 1       | 1       | 1       | 1       | 1       |

|     |           |        |        |         |         |         |         |
|-----|-----------|--------|--------|---------|---------|---------|---------|
| A72 | Intercept | 1      | 1      | 1       | 1       | 1       | 1       |
|     | BQ        | 0.7962 | 0.7987 | 0.7645  | 0.6173  | 0.2682  | 0.2860  |
|     | sin       | 0.1552 | 0.6358 | 0.9276  | 0.9887  | 0.7862  | -0.1441 |
|     | cos       | 0.9879 | 0.7719 | 0.3737  | -0.1496 | -0.6180 | -0.9896 |
|     | sin1      | 0.3066 | 0.9815 | 0.6932  | -0.2959 | -0.9717 | -0.6763 |
|     | cos1      | 0.9518 | 0.1916 | -0.7207 | -0.9552 | -0.2361 | 0.7366  |
|     | Consent   |        |        |         |         |         |         |

**A72 Concentration      1101      1293      1423      1280      691      328      295**

|     |           |        |        |         |         |         |         |
|-----|-----------|--------|--------|---------|---------|---------|---------|
| M34 | Intercept | 1      | 1      | 1       | 1       | 1       | 1       |
|     | BQ        | 0.5327 | 0.5371 | 0.4823  | 0.3056  | 0.0880  | 0.0519  |
|     | sin       | 0.1552 | 0.6358 | 0.9276  | 0.9887  | 0.7862  | -0.1441 |
|     | cos       | 0.9879 | 0.7719 | 0.3737  | -0.1496 | -0.6180 | -0.9896 |
|     | sin1      | 0.3066 | 0.9815 | 0.6932  | -0.2959 | -0.9717 | -0.6763 |
|     | cos1      | 0.9518 | 0.1916 | -0.7207 | -0.9552 | -0.2361 | 0.7366  |
|     | Consent   | 1.0000 | 1.0000 | 1.0000  | 1.0000  | 1.0000  | 1.0000  |

**M34 Concentration      510      536      508      369      177      105      115**

|                              |              |             |             |             |             |             |            |            |
|------------------------------|--------------|-------------|-------------|-------------|-------------|-------------|------------|------------|
| CC 48                        | Intercept    | 1           | 1           | 1           | 1           | 1           | 1          | 1          |
|                              | BQ           | 0.7551      | 0.7565      | 0.7368      | 0.6548      | 0.3148      | 0.2090     | 0.3339     |
|                              | sin          | 0.1552      | 0.6358      | 0.9276      | 0.9887      | 0.7862      | 0.3629     | -0.1441    |
|                              | cos          | 0.9879      | 0.7719      | 0.3737      | -0.1496     | -0.6180     | -0.9318    | -0.9896    |
|                              | sin1         | 0.3066      | 0.9815      | 0.6932      | -0.2959     | -0.9717     | -0.6763    | 0.2852     |
|                              | cos1         | 0.9518      | 0.1916      | -0.7207     | -0.9552     | -0.2361     | 0.7366     | 0.9585     |
|                              | Consent      | 1.0000      | 1.0000      | 1.0000      | 1.0000      | 1.0000      | 1.0000     | 1.0000     |
| CC 48 Concentration          |              | <b>1831</b> | <b>1810</b> | <b>1877</b> | <b>1802</b> | <b>933</b>  | <b>451</b> | <b>534</b> |
| A68                          | Intercept    | 1           | 1           | 1           | 1           | 1           | 1          | 1          |
|                              | BQ           | 0.6128      | 0.6171      | 0.5623      | 0.3771      | 0.1085      | 0.0640     | 0.1178     |
|                              | sin          | 0.1552      | 0.6358      | 0.9276      | 0.9887      | 0.7862      | 0.3629     | -0.1441    |
|                              | cos          | 0.9879      | 0.7719      | 0.3737      | -0.1496     | -0.6180     | -0.9318    | -0.9896    |
|                              | sin1         | 0.3066      | 0.9815      | 0.6932      | -0.2959     | -0.9717     | -0.6763    | 0.2852     |
|                              | cos1         | 0.9518      | 0.1916      | -0.7207     | -0.9552     | -0.2361     | 0.7366     | 0.9585     |
|                              | Consent      | 1.0000      | 1.0000      | 1.0000      | 1.0000      | 1.0000      | 1.0000     | 1.0000     |
| <b>A68 Concentration</b>     |              | <b>1895</b> | <b>2270</b> | <b>2435</b> | <b>2069</b> | <b>1216</b> | <b>731</b> | <b>549</b> |
| Concentration in Groundwater |              | 0           | 0           | 0           | 0           | 0           | 0          | 0          |
| Load in pounds per day       |              |             |             |             |             |             |            |            |
|                              | Sum          | 454         | 499         | 636         | 1068        | 2869        | 2957       | 1279       |
|                              | A72          | 380         | 440         | 592         | 1071        | 2544        | 2120       | 994        |
|                              | % Difference | 0.19        | 0.13        | 0.07        | 0.00        | 0.13        | 0.40       | 0.29       |
|                              | RPD          | 0.18        | 0.13        | 0.07        | 0.00        | 0.12        | 0.33       | 0.25       |

| ganese Concentration Coefficients |           |           |            |                   |                   |
|-----------------------------------|-----------|-----------|------------|-------------------|-------------------|
| Bq                                | sin       | cos       | sin1       | cos1              | Consent           |
| 1300.01851                        | 258.05023 | 32.88141  | -22.83880  | <u>-115.51468</u> | 0.000             |
| 676.85542                         | 28.85039  | 45.76225  | 2.36955    | <u>-21.93733</u>  | 0                 |
| 2418.14462                        | 55.02265  | 133.79117 | -163.86850 | -115.75164        | <u>-611.58877</u> |
| 2357.47898                        | 524.74014 | 10.67654  | -7.02235   | -157.22271        | <u>472.32632</u>  |

| A   | S   | O   | N  | D  |
|-----|-----|-----|----|----|
| 1   | 1   | 1   | 1  | 1  |
| 268 | 187 | 142 | 92 | 70 |
| 103 | 71  | 53  | 33 | 25 |
| 37  | 26  | 20  | 16 | 14 |
| 122 | 82  | 60  | 38 | 28 |
| 6   | 8   | 9   | 4  | 3  |

|        |        |        |        |        |
|--------|--------|--------|--------|--------|
| 0.4826 | 0.5721 | 0.6378 | 0.7310 | 0.7813 |
| 0.1997 | 0.2657 | 0.3255 | 0.4348 | 0.5082 |
| 0.5317 | 0.6145 | 0.6727 | 0.7167 | 0.7465 |
| 0.2464 | 0.3278 | 0.4016 | 0.5134 | 0.5884 |

|         |         |         |         |         |
|---------|---------|---------|---------|---------|
| -0.6271 | -0.9360 | -0.9878 | -0.7716 | -0.3573 |
| -0.7789 | -0.3521 | 0.1556  | 0.6361  | 0.9340  |
| 0.9769  | 0.6591  | -0.3074 | -0.9816 | -0.6674 |
| 0.2135  | -0.7521 | -0.9516 | -0.1908 | 0.7447  |
| 1       | 1       | 1       | 1       | 1       |

|         |         |         |         |         |
|---------|---------|---------|---------|---------|
| 1       | 1       | 1       | 1       | 1       |
| 0.4826  | 0.5721  | 0.6378  | 0.7310  | 0.7813  |
| -0.6271 | -0.9360 | -0.9878 | -0.7716 | -0.3573 |
| -0.7789 | -0.3521 | 0.1556  | 0.6361  | 0.9340  |
| 0.9769  | 0.6591  | -0.3074 | -0.9816 | -0.6674 |
| 0.2135  | -0.7521 | -0.9516 | -0.1908 | 0.7447  |

**503          673          806          927          993**

|            |            |            |            |            |
|------------|------------|------------|------------|------------|
| 1          | 1          | 1          | 1          | 1          |
| 0.1997     | 0.2657     | 0.3255     | 0.4348     | 0.5082     |
| -0.6271    | -0.9360    | -0.9878    | -0.7716    | -0.3573    |
| -0.7789    | -0.3521    | 0.1556     | 0.6361     | 0.9340     |
| 0.9769     | 0.6591     | -0.3074    | -0.9816    | -0.6674    |
| 0.2135     | -0.7521    | -0.9516    | -0.1908    | 0.7447     |
| 1.0000     | 1.0000     | 1.0000     | 1.0000     | 1.0000     |
| <b>199</b> | <b>275</b> | <b>339</b> | <b>423</b> | <b>479</b> |

|            |             |             |             |             |
|------------|-------------|-------------|-------------|-------------|
| 1          | 1           | 1           | 1           | 1           |
| 0.5317     | 0.6145      | 0.6727      | 0.7167      | 0.7465      |
| -0.6271    | -0.9360     | -0.9878     | -0.7716     | -0.3573     |
| -0.7789    | -0.3521     | 0.1556      | 0.6361      | 0.9340      |
| 0.9769     | 0.6591      | -0.3074     | -0.9816     | -0.6674     |
| 0.2135     | -0.7521     | -0.9516     | -0.1908     | 0.7447      |
| 1.0000     | 1.0000      | 1.0000      | 1.0000      | 1.0000      |
| <b>987</b> | <b>1391</b> | <b>1779</b> | <b>1984</b> | <b>1959</b> |

|            |            |             |             |             |
|------------|------------|-------------|-------------|-------------|
| 1          | 1          | 1           | 1           | 1           |
| 0.2464     | 0.3278     | 0.4016      | 0.5134      | 0.5884      |
| -0.6271    | -0.9360    | -0.9878     | -0.7716     | -0.3573     |
| -0.7789    | -0.3521    | 0.1556      | 0.6361      | 0.9340      |
| 0.9769     | 0.6591     | -0.3074     | -0.9816     | -0.6674     |
| 0.2135     | -0.7521    | -0.9516     | -0.1908     | 0.7447      |
| 1.0000     | 1.0000     | 1.0000      | 1.0000      | 1.0000      |
| <b>713</b> | <b>902</b> | <b>1092</b> | <b>1359</b> | <b>1607</b> |

|   |   |   |   |   |
|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0 |
|---|---|---|---|---|

|      |      |      |      |      |
|------|------|------|------|------|
| 777  | 701  | 644  | 531  | 457  |
| 728  | 679  | 618  | 460  | 376  |
| 0.07 | 0.03 | 0.04 | 0.15 | 0.22 |
| 0.07 | 0.03 | 0.04 | 0.14 | 0.19 |

| A72                |          |        | Prediction Equation Coefficients |         |          |        |      |
|--------------------|----------|--------|----------------------------------|---------|----------|--------|------|
| Chronic TVS at A72 |          |        | Hardness AluminumCadmium         |         |          |        |      |
|                    | a2       | b2     |                                  |         |          |        |      |
| Cd                 | -3.49    | 0.7852 | B                                | 0.006   | 1.000    | 0.006  |      |
| Cu                 | -1.7428  | 0.8545 | Intercept                        | 82.304  | -26.540  | 1.020  |      |
| Mn                 | 5.8743   | 0.3331 | BQ                               | 200.676 | 5610.562 | 1.466  |      |
| Zn                 | 0.8669   | 0.8473 | sin                              | 16.936  | 158.116  | 0.599  |      |
|                    |          |        | cos                              | 48.860  | 40.749   | 0.066  |      |
|                    |          |        | sin1                             | 15.385  | 127.998  | -0.265 |      |
|                    |          |        | cos1                             | -5.633  | 6.691    | -0.292 |      |
|                    |          |        | Consent                          |         |          |        |      |
|                    |          |        |                                  |         |          |        |      |
|                    | Month    | J      | F                                | M       | A        | M      | J    |
|                    | Q        | 64     | 63                               | 77      | 155      | 682    | 1196 |
|                    | Hardness | 277    | 290                              | 268     | 196      | 91     | 53   |
|                    | Al ch    | 87     | 87                               | 87      | 87       | 87     | 87   |
|                    | Cd ch    | 2.5    | 2.6                              | 2.5     | 1.9      | 1.1    | 0.7  |
|                    | Cu ch    | 11     | 11                               | 10      | 8        | 4      | 3    |
|                    | Mn ch    | 2317   | 2352                             | 2290    | 2064     | 1598   | 1333 |
|                    | Zn ch    | 279    | 290                              | 271     | 208      | 109    | 68   |

| M 34               |  | Prediction equation coefficients |          |           |           |           |          |     |
|--------------------|--|----------------------------------|----------|-----------|-----------|-----------|----------|-----|
|                    |  | Hardness                         | Aluminum | Cadmium   | Copper    | Iron      | Zinc     |     |
| B                  |  | 0.013                            | 1.00     | 0.021     | 0.123     | 0.06521   | 0.021    |     |
| Intercept          |  | 60.05228                         | 15.10361 | 0.91724   | 14.65129  | 77.70523  | 05.25873 |     |
| BQ                 |  | 05.02801                         | 38.29032 | 0.60966   | 00.98354  | 70.29706  | 78.11589 |     |
| sin                |  | 9.24827                          | 69.03843 | 0.26911   | 14.16661  | 89.38888  | 88.77920 |     |
| cos                |  | 32.30173                         | 79.08681 | 0.20991   | 10.17487  | 38.04002  | 85.94018 |     |
| sin1               |  | 435.43127                        | -0.12214 | 1.04278   | 86.24646  | -17.99615 |          |     |
| cos1               |  | 123.10453                        | -0.14689 | -3.82920  | -12.30367 | -45.60154 |          |     |
| consent            |  | -265.10754                       |          | -10.75402 | 35.80515  | -98.00378 |          |     |
|                    |  |                                  |          |           |           |           |          |     |
| MONTH              |  | J                                | F        | M         | A         | M         | J        | J   |
| Q                  |  | 22                               | 22       | 28        | 58        | 266       | 468      | 243 |
| Hardness           |  | 255                              | 241      | 226       | 170       | 86        | 60       | 76  |
| Chronic StanAl, ch |  | 87                               | 87       | 87        | 87        | 87        | 87       | 87  |
| Cd, ch             |  | 2.4                              | 2.3      | 2.1       | 1.7       | 1.0       | 0.8      | 0.9 |
| Cu ch              |  | 20                               | 19       | 18        | 14        | 8         | 6        | 7   |

|       |      |      |      |      |      |      |      |
|-------|------|------|------|------|------|------|------|
| Mn    | 2253 | 2212 | 2163 | 1969 | 1571 | 1389 | 1504 |
| Zn ch | 260  | 248  | 235  | 185  | 104  | 76   | 93   |

#### A68 Animas at Silverton

|            |          | Prediction equation coefficients |         |        |           |          |      |
|------------|----------|----------------------------------|---------|--------|-----------|----------|------|
|            |          | Hardness                         | Cadmium | Copper | Manganese | Zinc     |      |
| B          |          | 0.011na                          | na      | 0.010  | 0.016     |          |      |
| Intercept  |          | 37.945                           | 2.395   | 5.783  | 258.473   | 304.617  |      |
| BQ         |          | 165.600                          |         |        | 1371.923  | 644.136  |      |
| sin        |          |                                  | 1.712   | 2.049  | 611.024   | 315.451  |      |
| cos        |          |                                  | 0.140   | 0.729  | 81.662    | -18.603  |      |
| sin1       |          |                                  | -0.250  | -1.520 | 16.031    | -33.783  |      |
| cos1       |          |                                  | -1.185  | -0.472 | -263.628  | -140.108 |      |
| May        |          |                                  | -1.936  | 2.261  | -258.699  |          |      |
| consent    |          |                                  | -0.714  | -1.828 | 411.428   | -67.174  |      |
| Animas R   | Month    | J                                | F       | M      | A         | M        | J    |
|            | Q        | 25                               | 25      | 31     | 66        | 329      | 585  |
|            | Hardness | 168                              | 168     | 161    | 134       | 74       | 60   |
|            | Cd, tvs  | 1.7                              | 1.7     | 1.7    | 1.4       | 0.9      | 0.8  |
|            | Cu tvs   | 14                               | 14      | 13     | 11        | 7        | 6    |
|            | Mn tvs   | 1959                             | 1961    | 1934   | 1818      | 1491     | 1393 |
| onic stand | Zn tvs   | 182                              | 183     | 177    | 151       | 91       | 77   |
|            |          |                                  |         |        |           |          | 94   |

# Reaction Equation Coefficients

| Copper  | Iron     | Zinc    |      |      |  |
|---------|----------|---------|------|------|--|
| 0.100   | 0.048    | 0.014   |      |      |  |
| 11.592  | 325.430  | 272.266 |      |      |  |
| -11.516 | 6156.248 | 697.432 |      |      |  |
| 5.618   | 310.323  | 155.229 |      |      |  |
| 5.955   | 262.025  | 37.490  |      |      |  |
| 1.700   | -72.066  | -37.359 |      |      |  |
| -0.594  | -177.065 | -77.421 |      |      |  |
| -1.491  |          |         |      |      |  |
|         |          |         |      |      |  |
| A       | S        | O       | N    | D    |  |
| 268     | 187      | 142     | 92   | 70   |  |
| 124     | 158      | 182     | 215  | 248  |  |
| 87      | 87       | 87      | 87   | 87   |  |
| 1.3     | 1.6      | 1.8     | 2.1  | 2.3  |  |
| 5       | 7        | 7       | 9    | 10   |  |
| 1772    | 1920     | 2013    | 2129 | 2233 |  |
| 141     | 173      | 195     | 225  | 255  |  |

|    | Acute TVS at M34 |        | Chronic TVS at M34 |        |
|----|------------------|--------|--------------------|--------|
|    | a2               | b2     | a3                 | b3     |
| Cd | -3.828           | 1.128  | -3.49              | 0.7852 |
| Cu | -0.7703          | 0.9422 | -1.7428            | 0.8545 |
| Mn | 4.4995           | 0.7893 | 5.8743             | 0.3331 |
| Zn | 0.8904           | 0.8473 | 0.8669             | 0.8473 |

| A   | S   | O   | N   | D   |
|-----|-----|-----|-----|-----|
| 103 | 71  | 53  | 33  | 25  |
| 126 | 151 | 192 | 217 | 253 |
| 87  | 87  | 87  | 87  | 87  |
| 1.4 | 1.6 | 1.9 | 2.1 | 2.3 |
| 11  | 13  | 16  | 17  | 20  |



|      |      |      |      |      |
|------|------|------|------|------|
| 1783 | 1892 | 2050 | 2136 | 2246 |
| 144  | 167  | 205  | 227  | 258  |

| Chronic TVS at A68 |         |        |
|--------------------|---------|--------|
|                    | a2      | b2     |
| Cd                 | -3.49   | 0.7852 |
| Cu                 | -1.7428 | 0.8545 |
| Mn                 | 5.8743  | 0.3331 |
| Zn                 | 0.8669  | 0.8473 |

  

| A    | S    | O    | N    | D    |
|------|------|------|------|------|
| 122  | 82   | 60   | 38   | 28   |
| 109  | 125  | 138  | 155  | 165  |
| 1.2  | 1.4  | 1.5  | 1.6  | 1.7  |
| 10   | 11   | 12   | 13   | 14   |
| 1695 | 1777 | 1836 | 1908 | 1947 |
| 126  | 142  | 155  | 171  | 180  |